BI 476/576: Terrestrial Ecosystem Ecology (F 2019)

Instructor: *Scott Bridgham*
362 Onyx Bridge, 346-1466, bridgham.@uoregon.edu

Office hours Thurs. 12:30-1:30 p.m., Friday 3-4 p.m., or by appointment.

Text (recommended): *Principals of Terrestrial Ecosystem Ecology*, second edition, 2011, F. Stuart Chapin III, Pamela A. Matson, and Peter Vitousek, Springer.

Extensive other readings from the primary wetland literature will be given throughout the term. These change from term to term to reflect the needs and interests of the students (and to keep me interested). They will be posted on Canvas as PDF files.

This course makes extensive use of the UO official course website, Canvas. To access the course page, go to the UO Canvas site (**http://canvas.uoregon.edu)** and follow the links from there. The username and password are the same as for your e-mail using the university server. If you have trouble you can get help from the Information Technology Center (Room 267 of the Knight Library).

Prerequisites: BI 370, Ecology

More fundamentally, I expect students going into this course to have a basic understanding of ecology, chemistry, geology, and physics.

Objectives and Class Mechanics

The objective of this class is to teach students the fundamentals of terrestrial ecosystem ecology, with an emphasis on the flux of nutrients, carbon, water, and energy in the environment and its interactions and consequences for organisms. The scale will range from the microbial to the global. My focus is on teaching the fundamentals of ecosystem ecology, the concepts of which can be easily transferred to any ecosystem, terrestrial or aquatic. However, these fundamentals are prerequisites for understanding the consequences and potential solutions of many of society's most pressing environmental problems. Thus, I will attempt to relate the concepts that we are discussing in class to current environmental problems as often as I can. There is a heavy emphasis in this class on how climate change has and will affect ecosystem function.

As opposed to most of ecology with its focus on relatively fuzzy theory, the basics of ecosystem ecology depend heavily on well-proven principles of chemistry, geology, hydrology, and physics. Thus, a significant component of ecosystem ecology is more aptly termed ***biogeochemistry***. Consequently, there is sizeable body of facts and details that must be learned to have a working knowledge of ecosystem ecology. Thus, the mechanics of the course will emphasize classroom lectures of often dense material delivered at a rapid pace via PowerPoint. It will require you to learn the details of the basic biogeochemical cycles of carbon and nitrogen. What you gain for this considerable effort, however, is a knowledge base that can be translated into any ecosystem and a multitude of environmental problems.

Detailed PowerPoint slides will be put on Blackboard at least 24 hours before lecture. I will also print them and give them as handouts before every lecture.

What this course is NOT

This course is not a natural history course of Northwestern terrestrial ecosystems. If you were expecting this (and still want it), you should drop the course now.

Learning Outcomes

- Become familiar with the cycles for water, energy, carbon, and nitrogen
- Know the basics of climate change, specifically what it is; the evidence for it in the past, present, and future; and how it may affect ecosystems
- Gain increased ability to critically read primary and secondary scientific articles

Grading Criteria

Students will be evaluated based upon a midterm, a final, summaries/questions pertaining to readings from the primary literature, a term paper and, for graduate students, an oral presentation. The final exam is comprehensive but will emphasize material since the mid-term.

The best way to get a good grade in this course is come to class every day and take good notes, as tests are based solely on my lectures. While I will not ask questions on the tests from the text, it is excellent and will improve your understanding of the lectures (and hence grade on the tests).

All late assignments will be docked by one third letter grade per day they are late.

Attendance is mandatory and will be taken at the beginning of every class. After the third unexcused absence within a term, your grade will be reduced by one-third letter grade for each additional unexcused absence.

Grading Distribution

Undergraduate Students	
Mid-term	25
Final	25
Term Paper	25
Leading of Paper Discussion	10
Paper Write-Ups	15
Total	100

Graduate Students	
Mid-term	25
Final	25
Term Paper	12.5
Presentation	12.5
Leading of Paper Discussion	10
Paper Write-Ups	15
Total	

Discussion of Primary Literature

Students will be required to read one **paper from the scientific literature** most weeks to provide actual, 'on-the-ground' examples of the topic being covered and to increase their knowledge of how science is communicated in the peer-reviewed literature. To make this a more

student-led exercise, groups of 2-3 students will provide approximately 10 minute overviews of the paper and then initiate a discussion of the paper with the entire class. Class discussions on papers will occur during Thursday's class, and all students (excepting the one presenting) will be required to submit two questions for discussion on Canvas (see Discussion tab) by midnight of the preceding Monday. This will help frame the student-led question and answer period. Because the timing of this is important for the students overseeing the paper discussion, **no late questions will be accepted**. Additionally, synopsis of the paper will be turned in during the class that we discuss it. The synopsis will be 1-2 typed pages and should consist of (1) the paper's main objectives/hypotheses, (2) its major findings, (3) how well it met those objectives/hypotheses, (4) your personal reactions to it, and (5) the two questions for class discussion.

You may find it useful to use PowerPoint or a similar program to display selected graphs and tables when you lead a paper discussion. These days if you go to the journal publishing the paper, figures and tables are often available for download. Alternatively, you can use a snipping tool. It is available in Windows 10 in the Start menu by clicking All Apps and toggling down to Windows Accessories.

Term Paper

A **term paper** of at least 5 single-spaced pages (font no larger than 12 point, 1 inch margins), excluding references, is due on the last class on the topic of your presentation. This paper must include an abstract and references in the format used for the journal *Wetlands* (http://www.springer.com/life+sciences/ecology/journal/13157). It must include at least 10 references that are appropriate to the topic, emphasizing peer-reviewed literature. These days abundant peer-reviewed publications are available on the web, but use other material on the web sparingly (ask me if you are unsure of the difference).

Graduate Student Presentations

On the last day class, the graduate students will give 12-15 minute oral presentations on the topic of their term paper. Practice and time your talk, because excessively long talks will have points deducted. Use of PowerPoint or some other software program is fine but up to you. A common mistake is not making your graphics large enough to see easily and to have too much text on slides.

Disabilities and Unexpected Crises

It is my goal to create an inclusive learning environment. Please notify me if there are aspects of this course that result in barriers to your participation. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu.

In a more general sense, I realize that personal crises sometimes happen. If you are having problems that are interfering with your ability to do the work in this class, please let me know promptly. I am willing to make special arrangements when the need is real ***and*** when you have done your best to deal with the situation in a timely manner.

Classroom Conduct

You are expected to follow University rules and guidelines for behavior. ***Academic dishonesty***, which includes cheating and plagiarism, is a serious offense and will be treated according to the guidelines in the Student Conduct Code (see Office of Student Life website).

Plagiarism is the inclusion of someone else's product, words, ideas, or data as one's own work. When a student submits work for credit that includes the product, words, ideas, or data of others, the source must be acknowledged by the use of complete, accurate, and specific references, such as footnotes. Expectations may vary slightly among disciplines. By placing one's name on work submitted for credit, the student certifies the originality of all work not otherwise identified by appropriate acknowledgements. On written assignments, if verbatim statements are included, the statements must be enclosed by quotation marks or set off from regular text as indented extracts.

A student will avoid being charged with plagiarism if there is an acknowledgement of indebtedness. Indebtedness must be acknowledged whenever:

1. *one quotes another person's actual words or replicates all or part of another's product;*
2. *one uses another person's ideas, opinions, work, data, or theories, even if they are completely paraphrased in one's own words;*
3. *one borrows facts, statistics, or other illustrative materials--unless the information is common knowledge.* (UO Policy on Academic Dishonesty, http://tep.uoregon.edu/workshops/teachertraining/learnercentered/syllabus/academicdishonesty.html)

Date	Topic	Text
Oct. 1	Course Mechanics, The Ecosystem Concept	Ch. 1
Oct. 3	Energy Flux and Climate I	Ch. 2, Ch. 4
Oct. 8	Energy Flux and Climate II, *Paper Summary Due*	
Oct. 10	Energy Flux and Climate III, *Literature Discussion*	
Oct. 15	Soils, *Paper Summary Due*	Ch. 3
Oct. 17	Soils, *Literature Discussion*	
Oct. 22	Water Flux I, *Paper Summary Due*	Ch. 4, pp. 403-407
Oct. 24	Water Flux II, *Literature Discussion*	
Oct. 29	**Mid-Term**	
Oct. 31	Carbon Cycling--Global to Local	pp. 407-415
Nov. 5	Photosynthesis I, *Paper Summary Due*	Ch. 5
Nov. 7	Photosynthesis II, *Literature Discussion*	
Nov. 12	Ecosystem Production, *Paper Summary Due*	Ch. 6
Nov. 14	Ecosystem Production, *Literature Discussion*	
Nov. 19	Decomposition I, *Paper Summary Due*	Ch. 7
Nov. 21	Decomposition II, *Literature Discussion*	
Nov. 26	Redox Chemistry and Nutrient/C Cycling	pp. 86-89, Chapter 9
Nov. 28	**Thanksgiving Holiday—no class**	
Dec. 3	Nitrogen Cycle	pp. 414-417
Dec. 5	**Grad Student Presentations, Term Papers Due**	
Dec. 11	**Final Exam, 12:30-2:30**	